

The Face Recurve Concept: Medical and Surgical Applications

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Abstract. The application of the Face Recurve theory gives rise to new technical opportunities in the fields of both aesthetic medicine and aesthetic surgery to block the action of the age marker fascicles largely responsible for aging of the paramedian folds. With respect to aesthetic medicine, the combination of botulinum toxin and soft tissue fillers has proven effective. On the basis of the authors' theory, however, two new technical refinements become pertinent. First, the filler must be injected predominantly deep to the muscle to treat the skin depressions in a more natural manner, bringing restoration to the curve of the overlying muscle. Second, a very low number of botulinum toxin units (one-fourth to one unit) should be injected into specific muscles to diminish their resting tone without diminishing their maximal contraction strength. With respect to aesthetic surgery, the authors present new techniques for the treatment of early aging, specifically a combination of segmental muscular section, microliposuction, and retro-muscular fat grafting, all of which can be performed readily with the patient under local anesthesia. For more advanced aging, surgery offers new treatment opportunities that include the concentric malar lift for correction of the midface region, with repositioning of suborbicularis oculi fat back onto the orbital rim from its descended eccentric displacement at the hands of repeated orbicularis oculi contractions. At the same time, specific muscles can be weakened and fat volume restored. Each area can be studied in a specific way and treated definitively. Currently, the skin does not need to be tensioned to a maximum during a face-lift for treatment of the irregular jaw line, the palpebro-malar groove, and so forth. Skin tension can be moderated to remove only the true excess of skin. Facial contour is improved, whereas the specific glide is restored between muscles and their underlying fat.

Key words: Age marker fascicule—Aging process—Botulinum toxin—Face Recurve—Fat injection—Filler—Malar lift—Mimetic muscles—Rejuvenation

We introduce a new approach to slow the onset of facial aging, and to rejuvenate the face with established aging. This strategy is based on our research into the major influence of age marker fascicles in the genesis of structural aging. Our theory, called Face Recurve, describes the role of these fascicles in the progressive transfer of deep fat toward superficial fat over time, as presented in the previous article. This second article presents new specific medical and surgical treatments based on this muscular theory of structural aging. Clinical results derived from these new techniques have proven favorable, as compared with earlier results.

Materials: Patient Study Group

This report describes the experience of injecting hyaluronic acid (Q med products: Restylane and Perlane, Q-Med AB, Uppsala, Sweden) as a filler substance. A total of 980 patients (1,960 orbital rim hollows) received injections over 8 years by the senior author (C. L.) into the tear trough depression using the technique described in the following discussion [1]. Of these patients, 20 were injected in the equivalent depression of the upper eyelid, and 110 patients were injected at the jaw line. Over 2 years, 21 patients received autologous fat injection into the tear trough depression, all during concomitant face-lift.

We describe a new rationale for using botulinum toxin A, with a low quantity of toxin in a small volume, which diminishes the resting tone of muscles

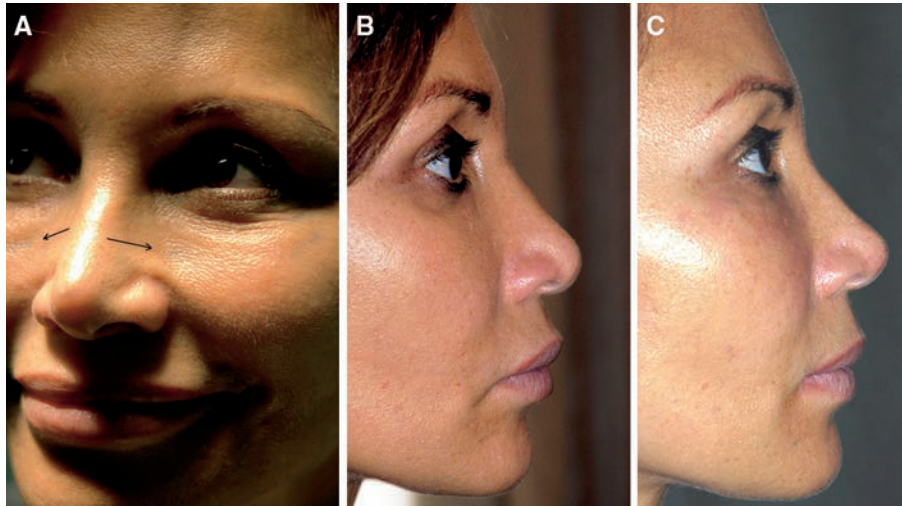


Fig. 1. (A) “Paranasal smile dimple” seen as a depression caused by contraction of the levator alaeque nasi muscle. (B) Profile of the face at rest showing anterior malar flattening due to the resting tone of the levator labii superioris alaeque nasi muscle. The distance between the bridge of the nose and the anterior malar increases with age. (C) After injection of Perlane 0.5 ml. The anterior malar area is advanced, reducing the distance between malar and nasal bridge.

without affecting the contraction at maximum strength. We report on 120 patients who received injections over 6 months. The indication of botulinum toxin injection in the sectioned muscle to limit muscle regeneration also is new, with 34 patients injected thus in the past 4 months. Surgical weakening of the superciliary region (corrugator and procerus) and the lateral canthal region (orbicularis oculi) through a lid incision [2] has become a standard procedure during our upper eyelid surgery when we wish to alter eyebrow position or address the glabella region.

Similarly, over the past 3 years, 120 patients have undergone surgical section of the depressor anguli oris supplemented with fat injection. Over the past 12 months, we have added sectioning of the levator alaeque nasii for seven patients. During the past 3 years, 132 patients (80% women) have undergone the concentric malar lift technique.

Methods

The Face Recurve strategy can be divided into four stages. During the prevention stage (stage 0), Toxin Recurving (around 25 years of age) uses botulinum toxin to prevent muscular shortening and fat transfer. The muscle resting tone in the young patient is maintained at a low level for a significant time without modification of the maximum contraction force. During aging stage 1, Toxin Filler Recurving (around 35 years of age) treats the early stages of aging by injection of the mimetic muscles to limit their contractile force and filling of the depressions resulting from the action of the age marker fascicules. Maintaining the resting tone of some muscles at a low level also is useful at this stage. During aging stage 2, Facial Recurve (around 45 years of age) involves surgical section of the age marker fascicules, with the patient under local anesthesia, and autologous fat grafting to restore deep fat. During aging stage 3,

Facial Recurve Lift (around 55 years of age and beyond) combines cutaneous face-lift with section of the age marker fascicules and structural fat grafting, but without the need for major skin traction to efface the furrows of structural aging. The stages then are modified to best meet the rejuvenation requirements of each patient in each specific locale.

Lateronasal Malar Rejuvenation

During the prevention stage of aging, botulinum toxin is injected to prevent shortening of the levator alaeque nasi and to limit fat transfer. Reduction of the superior nasolabial depression is achieved while the functional muscular elevation of the nasal ala is maintained by a very small quantity (1 Vistabel unit) of toxin placed into the muscle near its motor end plates (mid portion of the muscle above the pyriform aperture).

At the first stage of aging, rejuvenation is enhanced by injection of filler deep to the levator labii superioris to increase anterior malar projection. Filler also is injected deep to the levator alaeque nasii, the site of the paranasal smile dimple (Fig. 1), as well as in the overlying subcutaneous plane. The depression seen at the origin of the nasolabial fold is filled by injecting approximately 0.8 ml of filler between the cutaneous insertion of the levator alaeque nasi and the pyriform aperture (Fig. 2). During injection, an immediate freeing of the depressed alar base can be seen. We have found that intradermal filling of the superior aspect of the nasolabial depression produces an unnatural look because dermal filling cannot properly replace the retromuscular fat volume that has disappeared over time. Thus, intradermal filling is used only to fill the superficial wrinkles of the nasolabial sulcus.

At the second stage of aging, surgical weakening of the levator alaeque nasi through an intranasal



Fig. 2. (A) Patient with a visible tear trough depression extending from the one canthus to the other. The alar of the nose is depressed at the pyriform aperture and the corner of the mouth descends. (B) After administration of Perlane 1.3 ml to the periorbital hollow, the depression has disappeared, and there is no visible irregularity. The addition of Perlane 0.8 ml over the pyriform aperture has opened up the alar. Additionally, 0.33 ml also was injected very superficially into the vermillion and mucosa at the corner of the lower lip, resulting in lifting of the commissure.

mucosal approach is available, with the patient under local anesthesia (Fig. 3). This muscle is identified through the upper part of the intercartilaginous incision used in rhinoplasty.

Malar Rejuvenation and the Tear Trough Depression

At the prevention stage of aging, 2 to 3 units of botulinum toxin are injected and spread over the length of the orbicularis oculi superior malar part (4 injections of 0.25 Vistabel units) to reduce its resting muscle tone while leaving its contraction strength undiminished (Fig. 4). At the first stage of aging, in association with the botulinum toxin injection, filler is injected precisely on the bone to replace missing retromuscular fat. The risk of blindness is minimized if the injection is performed with minimal pressure in the preperiosteal plane, which is relatively avascular. We have no cases of visual disturbance in our series. Often, 1 ml of Perlane is necessary to fill the orbital rim hollow from the medial to the lateral canthus (Fig. 2). We first inject the deepest medial part of the orbital hollow using a standard 27-gauge needle. The needle is marched along the rim toward the lateral canthus using the "vacuum technique": the bevelled angle of the needle is placed on the rim; then the tip is elevated to create a depression, a vacuum, just below. The injected product will stay in the vacuum area and will have no risk to migrate laterally. Further injections along the depression are given medially and laterally as necessary. Any zygomatic hollow visible toward the cheek is injected very superficially with Perlane (0.3 ml). Filling the linear



Fig. 3. (A) A patient with a hollow superior nasolabial sulcus and elevated ala because of the high resting tone of the levator alaeque nasi muscle. The nasal ala is depressed against the pyriform aperture. (B) An intercartilaginous approach. At this point, the levator alaeque nasi muscle is seen close to bone. (C) After surgical section of the levator alaeque nasi muscle and injection of fat 0.7 ml over the pyriform aperture, the ala has descended, and depression of the upper nasolabial sulcus has diminished.

depressions of the orbital rim hollow and zygomatic hollow can make the malar bag disappear. The malar bag caused by inflammation, on the other hand, is treated with a superficial injection of a limited quantity of dexamethasone acetate. At a more advanced stage of aging, malar rejuvenation is performed using the concentric malar lift technique.

The Concentric Malar Lift

Background. In 1989, Tessier published the subperiosteal face-lift, which in addition to its well-known effects on the frontotemporal region, brought rejuvenation to the malar region [3]. In 1989 and again in 1992, Le Louarn published the malar musculofat flap [4,5], demonstrating that malar rejuvenation can be obtained during a subcutaneous face-lift that includes subperiosteal malar detachment. In 1996, a subperiosteal malar lift was described, which used the lateral, canthal part of a submuscular lower eyelid incision. Secondary lid retraction was avoided, whereas the arcus marginalis was left intact [2]. In 1998 the concept of the concentric malar lift [6] was published, but with a technique more complex than that recommended currently. The simpler technique followed in 2004 [7]. The concentric malar lift described in the following sections is an evolution of the later, simplified technique. Only new or further refinements are provided in this discussion.

Preoperative Markings. The curved line of the tear trough depression is first marked. Next, the central prominence of the nasolabial fold (Fig. 5, point M) is indicated. The third marking (Fig. 5, point O) is the

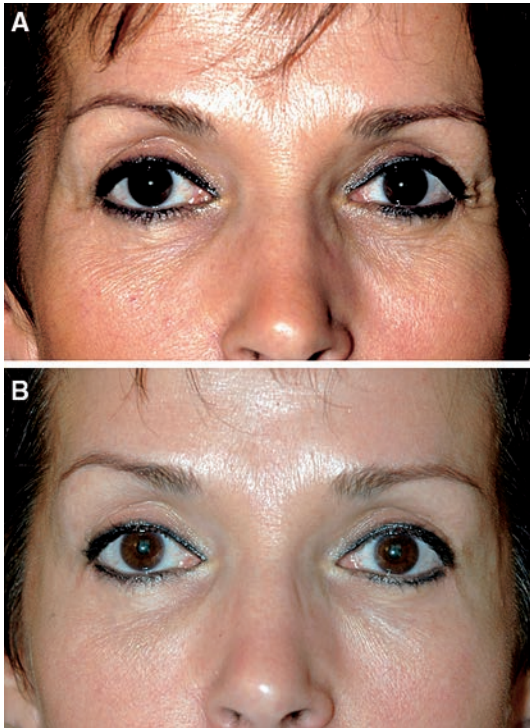


Fig. 4. (A) High resting tone of the superior malar part of the orbicularis muscle. The skin is creased, and the muscle accentuates the tear trough depression. (B) Reduction of the trough depression by injection of Perlane 0.3 ml into the medial tear. The resting tone of the superior malar part of the orbicularis muscle has been reduced by injection of 2 units of Vistabel spread via four injection points.

lower limit of the skin-orbicularis oculi dissection in the parasagittal plane of the lateral canthus. This point also indicates the lateral extent of the new subtarsal furrow, which usually falls in the palpebromalar groove.

Infiltration with 40 cc of saline per side, before surgery, decreases drastically the post operation oedema duration.

Subcutaneous Dissection. The superficial dissection extends from the subciliary incision to point 0 (Fig. 5) in the lateral part of the eyelid.

Subperiosteal Dissection. The deep dissection is performed through a 1.5-cm oblique muscle incision extending from the lateral canthus. To avoid the risk of secondary eyelid malposition, the muscle incision should not extend more than 2 mm medial to the lateral canthus. For the same reason, it is important to free the orbital rim from all soft tissue attachments while leaving the arcus marginalis intact. The muscle incision extends inferolaterally, parallel to the axis of the orbicular branches of the zygomatic nerve. A variation of this muscular incision is used since September 2006 to achieve a better visualization of

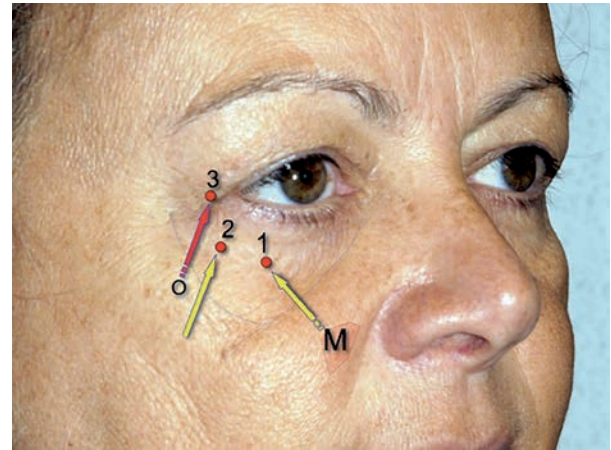


Fig. 5. Concentric malar lift markings and vectors. Point M is at the site of maximum malar fat pad volume. The tear trough depression is treated by lifting M to 1. The depression of the lateral part of the orbital rim is treated by lifting the deep fat (yellow arrows) in 2. Point O is the point on the skin that is transposed to 3 at the lateral canthus. This point is the lower extremity of the skin-muscle dissection in this patient (red arrow).

the inferior orbital rim. The incision is parallel to the orbicularis fibers at the lower part of the lateral orbital rim just above point O. For these two types of incision, submuscular tissues are carefully retracted before periosteal incision.

The Three Fixation Points. Point 1 (Fig. 6A) is drilled in the lower orbital rim close to its junction with the lateral rim. Point 2 (Fig. 6B) is drilled in the lateral rim between the lateral canthus and point 1. Point 3 (Fig. 6C) is drilled at the level of the lateral canthus such that there will be no elevation of the eyelid commissure.

Fixation. Fixation of the Malar Fat Pad and the Deep Malar Tissue on the Lower Orbital Rim (Figs. 6A and Fig. 7: point M to point 1). A Prolene 3-0 suture on a straight needle is inserted through the lateral muscle opening into the freed subperiosteal plane. The tip of the needle is brought through the skin at point M, encompassing the deep fat as it is elevated by a finger (Fig. 7A). The straight needle is advanced but not withdrawn from the skin such that its suture-bearing end remains 1 cm within the cheek (Fig. 7B). The needle end is then pushed backward, this time passing above the deep fat pad and reentering the subperiosteal space, from which it is withdrawn via the same muscle opening (Fig. 7C). The straight needle is then shortened to a length of 1 cm and curved with a needleholder so that the Prolene suture can be passed through point 1 (Fig. 6 A). It is then tied, bringing inferior volume back onto the orbital rim and improving the tear trough depression. Using the same technique, a second

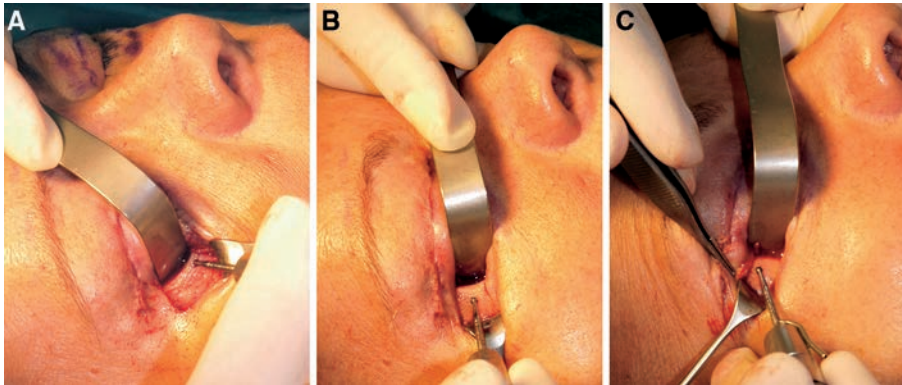


Fig. 6. The three holes through inferior and lateral orbital rims. (A) Point 1 allows fixation of the medial and deep malar fat as well as the superficial malar fat pad. (B) Point 2 allows fixation of the inferolateral malar volume. (C) Point 3, at the canthus, allows fixation of the lateral malar volume and the superior malar part of the orbicularis muscle.



Fig. 7. Treatment of the tear trough depression. (A) The straight needle is held by a needleholder in the subperiosteal plane. It exits at point M, after a finger has elevated the fatty volumes. (B) The needle has not exited completely. It is pushed back toward the detachment plane after it has encircled the deep fat volume and the underlying periosteum to be elevated. (C) The medial half of the malar tissue is lifted. The suture is fixed to point 1 (Fig. 6A). Another needle is passed more superficially to lift, like a hammock sling, the malar fat pad. The suture also is fixed to point 1.

suture is passed from the same point 1, but more superficially to encompass the malar fat pad and suspend it like a hammock. The amount of vertical skin to be removed from the lower eyelid depends on the degree of elevation produced with these two sutures.

Fixation of the Lateral and Inferior Malar Tissues (Figs. 6B and Fig. 8). The inferolateral malar soft

tissue is engaged in similar fashion and elevated at an axis slightly oblique and medial as the needle of the 3-0 Prolene is passed through drill hole 2. This elevation visually fills the deep aspect of the lateral malar area. It can be simulated by pulling with a Gillies hook before suture fixation, with the hook engaged at the intersection of a vertical line through the lateral canthus and a horizontal line through the alar base. A second fixation can be performed

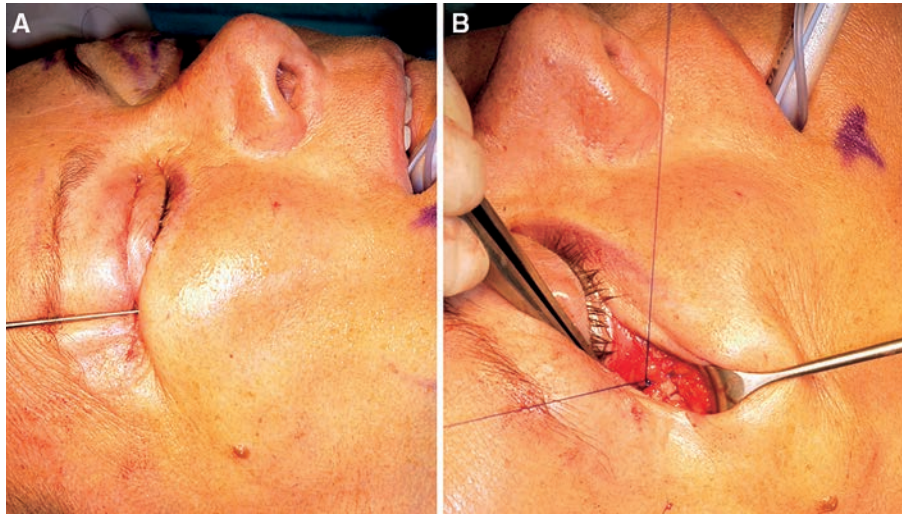


Fig. 8. Fixation of the lateral and inferior malar tissues at point 2 (Fig. 6B). (A) A Gillies hook placed in the subperiosteal plane checks the correct position before placement of the suture traction. (B) The lifted tissues are fixed to point 2 (Fig. 6B). This fixation is performed through the muscle incision without crossing the skin.

through the same hole and on the same line of elevation as the first, but at a higher level, near hole 2, to anchor the lateral lower eyelid elevation. The amount of vertical skin to be removed from the lateral lower lid depends on the degree of elevation secured by these sutures.

Fixation of the Lateral and Superior Malar Tissues at Point 3 (Fig. 6C) and Closure of the Orbicularis Incision (Fig. 9). Preperiosteal tissue at point O (Fig. 5) is next fixed to the lateral orbital rim (Fig. 6C) at point 3 overlying the lateral orbital rim at the lateral canthus. Just above the inferior limit of the skin-muscle dissection (Fig. 5, point O), the deep surface of the orbicularis oculi muscle is engaged with a 5-0 Vicryl mattress suture brought to the upper edge of the orbicularis oculi muscle incision near point 3.

Orbicularis Oculi, Superior Malar Part, and Muscle Weakening. Three muscle myotomies are performed in this muscle segment through the skin opening with a pair of delicate scissors. Injection of 2 Vistabel units blocks muscle regeneration.

Fat Excision. If there are excessive fat bags in the lower eyelid from a young age (genetic etiology), they can be removed, but if the excess is recent and limited (aging etiology), then removal is unnecessary.

Skin Excision (Fig. 10). Eyelid skin excision, although significant, is reliably safe because of the solid fixation at points 1 and 2. The amount of skin to be removed is assessed as the excess at the cilia level when downward traction is applied on the malar skin. However, if the palpebral margin descends more than 3 mm, then the periosteal fixations need to be redone. This maneuver eliminates the risk of ectropion. Release at the subperiosteal plane is the only soft tissue

release for which we consider reattachment to be stable. In our early cases, our skin excision was very modest because we knew that residual excess could be removed secondarily with the patient under local anesthesia.

Rejuvenation of the Superciliary Area

At the prevention stage of aging, botulinum toxin can be injected in the corrugator, procerus, and orbicularis oculi muscles at the superior palpebral hollow. Doses (1 unit per injection point) should be sufficient to decrease the resting tone without limiting the maximum power of contraction. At the first stage of aging, injection of botulinum toxin into the corrugator [8] improves the glabella furrows and, when associated with depressor supercillii injection, elevates the medial eyebrow. Injection of Perlane (0.1 ml) under the muscle further improves rejuvenation of the area. In the presence of superior palpebral hollowing, the injection must be precisely on the bone of the upper orbital rim, so as not to be visible, thus replacing the fat that has been expelled by the muscle (Fig. 11). Nevertheless, injection must avoid the superior orbital rim and not fill the levator palpebrae muscle, the source of ptosis.

At the second stage of aging, improvement may be gained by surgical resection of the depressor muscles via an upper eyelid approach [2]. The transverse head of the corrugator can be readily included in this ablation. Eyebrow position is thus modified without the need for a frontal lift. The orbicularis oculi muscle fascicle corresponding to the supraorbital hollow is also sectioned in three. At the same time, fat deficiency is addressed by either injection or transposition. With respect to the latter, the medial and central palpebral fat bags can be

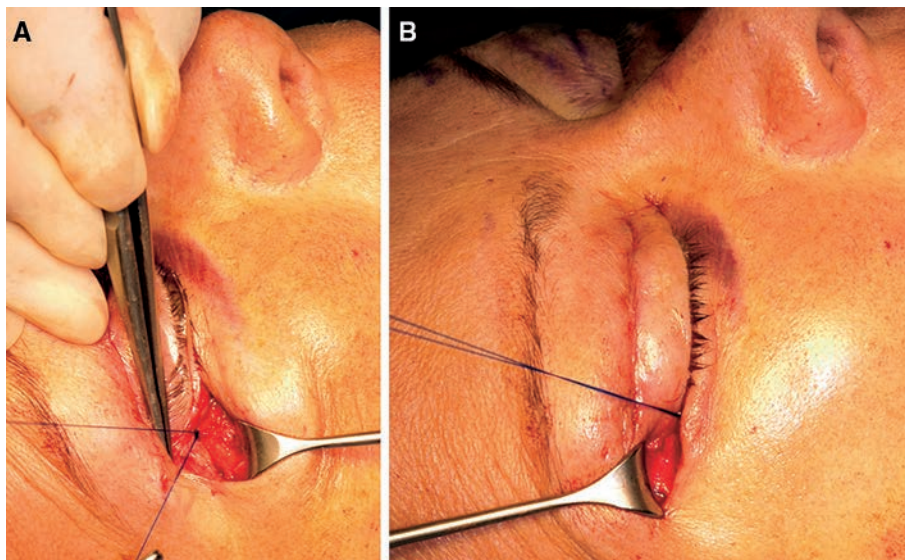


Fig. 9. Treatment of the superolateral part of the orbital rim hollow and muscle fixation. (A) The superolateral malar tissues (point O) are fixed at point 3. (B) The superior malar part of the orbicularis oculi muscle at point O (Fig. 5) is vertically fixed to the upper edge of the orbicularis oculi incision near point 3.

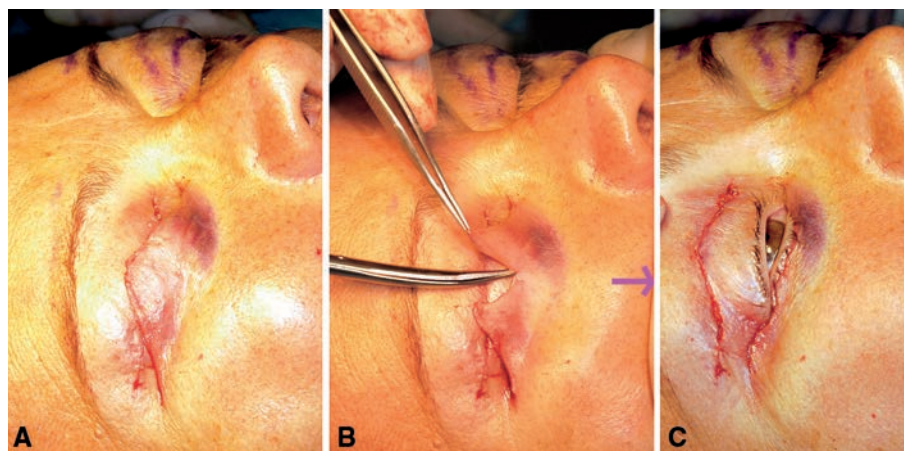


Fig. 10. Treatment of the lower eyelid skin excess. (A) As a result of the concentric nature of the malar lift, the cutaneous excess is centered on the eyelid and not laterally. An efficient tissue elevation through point 1 induces a nice correction of the tear through depression. (B) The quantity of available skin that can be resected at the lower eyelid safely relates to the amount of elevation to point 1. To keep the excision conservative, the amount is determined while downward traction is applied on the malar skin. (C) There is no overcorrection. Neither the palpebral fissure nor the lateral canthus is elevated. There is no temporal skin excess.

transposed toward the supraorbital hollow and fixed with 5-0 Vicryl [2]. To elevate the tail of the eyebrow, the lateral orbital part of the orbicularis oculi (which contains a high density of motor end plates) is denervated by a C-shaped myotomy performed via the upper eyelid incision. Dissection at the undersurface of the orbicularis muscle must be performed with caution to preserve motor branches addressed to the superior orbital part. To avoid tension pulling down the lateral brow after closure of the upper blepharoplasty incision, very little lateral skin is resected. To induce a more almond-shaped eye, botulinum toxin commonly is injected at the lateral extremity of the pretarsal orbicularis, but

a more permanent result can be achieved by a limited resection of muscle in this area.

Rejuvenation of the Bitterness Fold

At the prevention stage of aging, botulinum toxin injections decrease the resting tone of the depressor anguli oris in its midportion, where the motor end plates are located, limiting development of the marionette fold. At the first stage of aging, filler can be injected into the depression of the bitterness fold, as well as into the anterior prejowl depression above the mandibular border. Superficial injection of the

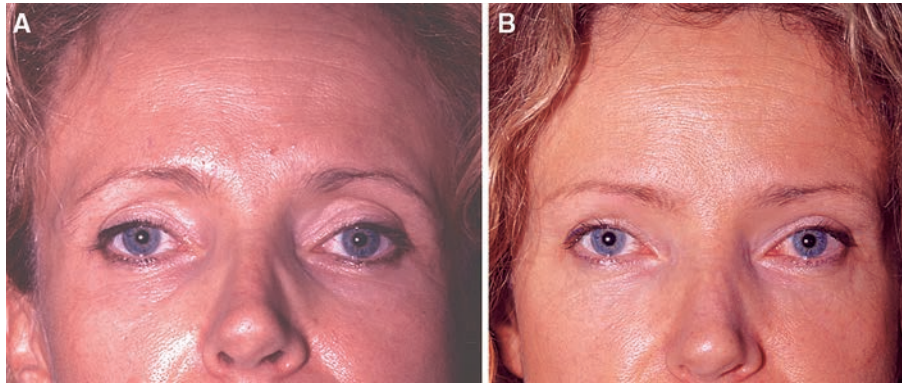


Fig. 11. (A) Patient with a visible upper eyelid hollow and a limited tear trough depression. (B) The upper eyelid hollow and tear trough have been filled with Perlane injected on the bone. The upper eyelid required 1.2 ml, and the lower eyelid required 0.4 ml. Botulinum toxin injection elevates the tail of the eyebrow and improves the skin of the lower eyelid.

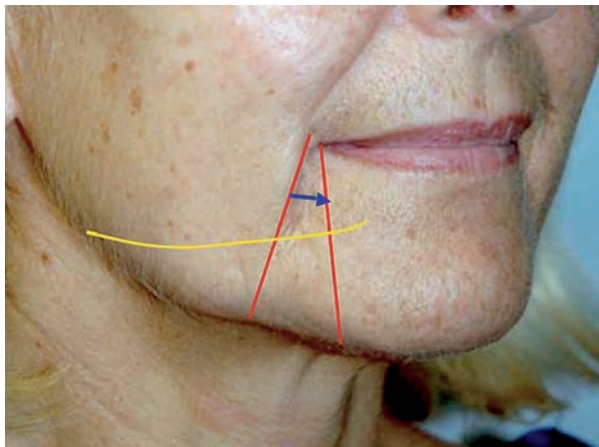


Fig. 12. Rejuvenation of the bitterness fold. *Red lines:* Projection on the skin of the depressor anguli oris muscle. *Blue line:* Level of the mucosal approach for horizontal transection of the depressor anguli oris and the lateral platysma muscles. *Yellow line:* Highest possible projection of the mandibular branch of the facial nerve (ramus marginalis).

vermilion and mucosa at the lower lip commissure unfolds the lower lip and lifts the commissure (Fig. 2). Further improvement is gained by injecting botulinum toxin into the depressor anguli oris at its midportion. The mentalis often is included in this injection because it is noted frequently to contract in conjunction with the depressor anguli oris. Likewise, lateral platysma contraction is frequently associated with depressor labii inferioris contraction. Thus the lateral platysma also can be injected. We suggest testing before injection that it be determined whether the descent of the corner of the mouth stems more from the depressor anguli oris or from the lateral platysma.

At a more advanced stage of aging, the depressor anguli oris can be sectioned transversely at the lower border of its upper quarter via a transoral mucosal approach, with blunt separation through the buccinator fibers to reach the more superficial depressor (Fig. 12). The mandibular branch of the facial nerve (ramus mandibularis) is ascending at this point to innervate the depressor labii inferioris and can be

safely avoided by using this high mucosal incision. The most effective part of the depressor anguli oris is its anterior part, which must be specifically sought out and sectioned (Fig. 13). At the same time, liposuction can be performed to reduce the jowl, whereas fat injection may be carried out beneath the bitterness fold and prejowl depression over the mandibular border.

Neck Rejuvenation

At the prevention stage of aging, low doses of botulinum are injected into the anterior and lateral segments of the platysma as well as the depressor anguli oris. At the first stage of aging, botulinum toxin is injected at standard doses (2 to 3 points of injection per segment with 2 units per point) in the anterior and lateral segments of the platysma. Hyaluronic acid injected into transverse neck creases also can be beneficial in the early stages of aging. Botulinum toxin injection of the platysma is most effective at the level of the cervicomandibular angle, but also may be used along the lateral platysma. The depressor anguli oris also can be injected.

At a later stage of aging, a transverse incision of the platysma at the level of the cervicomandibular angle, associated with a Vistabel injection, brings more lasting relief because it induces a stable anterior neck by limiting the advancement of neck skin when the anterior platysma contracts. Application of 4-0 Prolene horizontal plication sutures to the anterior and lateral platysma decreases the neck girth, supports the ptotic submandibular gland, and elongates the lateral platysma muscle (Fig. 14). Median horizontal plication of the submental platysma reduces submental bulging. This cervical lift does not rely on posterior or superior platysma traction to rejuvenate the neck, as do traditional techniques. Our rejuvenation process decreases the neck diameter at the cervicomandibular junction, recreating the hourglass shape. The sternocleidomastoid aponeurosis is lifted vertically and fixed with five sutures of 4-0 Prolene. The dissection plane between the skin and muscle is closed with 4-0 Prolene quilting sutures to eliminate dead space. As these sutures are placed, the skin is



Fig. 13. (A,B) A woman who still is unhappy after two face-lifts due to persistence of the bitterness fold. The fold is visible even when the face is at rest due to constant contraction of her depressor anguli oris. During forced contraction, the corners of her mouth descend, and the folds become more numerous. (C,D) Appearance 5 months after surgical section of the patient's depressor anguli oris muscles. Note that they no longer contract at rest. The folds are diminished, and the region is no longer hollow. During forced contraction, the corners of her mouth no longer descend, and the folds are reduced. The patient is very comfortable with this change.

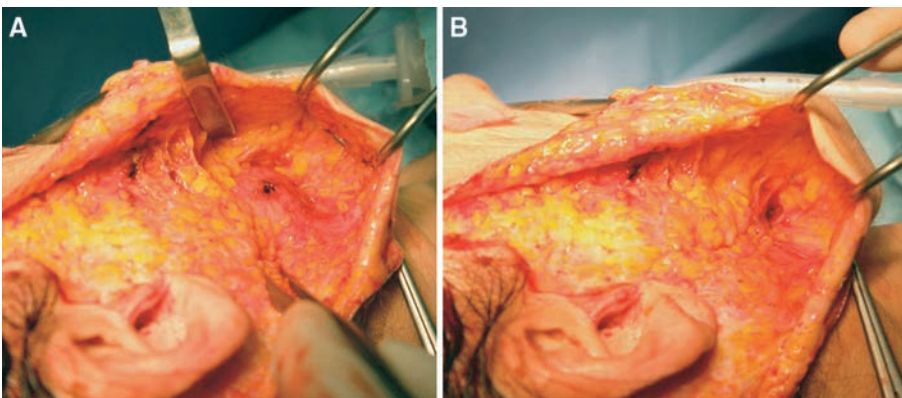


Fig. 14. (A) Submandibular gland ptosis creates a visible bulge during surgery. (B) Horizontal plication sutures restore the concave young cervicomandibular angle.

advanced slightly in the cephalad direction. Any small dimples that develop are eliminated by the next judiciously placed suture. Our aim is to reduce both tension and postoperative edema as well as the risk of hematoma, and of course, to obtain long-lasting stability.

Results

We have used the concentric malar lift and palpebral muscle resection for more than 10 years. However, our experience with levator labii superioris section is only 6 months long, and hence our reported evaluation is only preliminary. Nevertheless, our rejuvenation procedures follow scientifically based concepts as we attempt to regain the natural appearance of youth.

Figures 15, 16, and 17 show representative results for patients who have undergone various surgical techniques to rejuvenate, from the early to the more

advanced changes of aging. All surgery carries the risk of complications. Complications encountered with the concentric malar lift have been limited to two areas of concern: lateral overcorrection and prolonged postoperative edema. Over-elevation of malar tissues and the lateral canthus occurred in two patients early in our series. Better fixation has increased the stability of our results, and we have learned to avoid overcorrection at the time of surgery. We have not seen ectropion.

Our second area for concern has been the occasional patient with protracted recovery, the frequency of which has significantly diminished with use of the refinements detailed earlier. We tell all patients of the possibility of edema lasting up to 1 month. We have found it useful to include anti-inflammatory medication, manual lymphatic drainage and massage, and camouflage makeup in aftercare. In our hands, lateral orbicularis weakening to induce eyebrow tail elevation stays the main cause of chemosis.



Fig. 15. (A,B,C) A 57-year-old with skin excess and hollowing in the medial part of the upper eyelid. There is a visible hollowing at the inferior orbital rim, mainly laterally, and descent of the lower eyelid. The patient's lower eyelid is no longer supported because the lateral malar volume has descended at the midcheek level (oblique view). (D,E,F) Appearance 6 months after surgery including an upper blepharoplasty and a lower eyelid concentric malar lift. There has been no associated procedure (e.g., no temporal lift, no fat filling, no filler, no botulinum toxin). The upper eyelid hollow is less visible. Weakening of the corrugator muscle has smoothed the glabella. The lower eyelid skin excess has disappeared, and the orbital rim hollow is improved with fat transposition.

When the cervical lift is performed, there may be early irregularity from the quilting sutures. This is minimized by using a subtle rather than a forced elevation with each stitch placed. Should signs of skin ischemia appear behind the ear, a trinitrine patch placed over the area may be of help.

Discussion

Muscle-Sectioning Surgery

The effects of muscle surgery are powerful and can be modulated from total muscle resection to partial, staged muscle incision. The main drawback of muscle sectioning is the potential for functional recovery within 6 months. Such risk of recurrence depends on the anatomy of the muscle. Corrugator section alone does not produce separation between the two segments, so spontaneous functional recovery is high. At least a partial resection is necessary to suppress function.

On the other hand, section of the depressor anguli oris instantly creates a large separation with a low risk of functional recovery. A key point is that care must be taken to section the most anterior part of

depressor anguli oris, its strongest part. Otherwise, depressor function may recover. It is important to assess properly the muscle function that requires weakening. In the case of the descending oral commissure, for example, vertical descent is caused by the depressor anguli oris, whereas posterior oblique descent is caused by the lateral platysma. From such an assessment, it can be determined which muscle action needs to be modified by section. It is well known that injured (or sectioned) skeletal muscle can repair itself via spontaneous regeneration. However, the overproduction of extracellular matrix and excessive collagen deposition lead more often to fibrosis than to functional muscular healing [9]. Stretching exercises after a muscle laceration injury have a strong antifibrotic effect, and some studies suggest that the best time to begin stretching exercises is 14 days after laceration for muscle regeneration with minimal fibrosis [10]. From Jarvinen et al. [11], we know that overimmobilization after muscle injury results in a poor functional muscle outcome. Hence, to slow the muscle regeneration and discourage functional healing, we inject the muscle area with botulinum toxin after the surgical procedure, favoring nonfunctional fibrosis over muscular regeneration.



Fig. 16. (A,B,C) A 46-year-old woman with high resting tone of her corrugator, orbicularis oculi, levator alaeque nasi, and depressor anguli oris muscles. (D,E,F) Appearance 5 months after a cervico facial lift and an eyelid procedure associated with multimuscule weakening and a concentric malar lift. The tail of the eyebrow is lifted (oblique view), the infraorbital hollow is reduced, and the anterior malar projection has improved (oblique and profile views). This patient did not receive any additional treatment (e.g., hyaluronic acid, Vistabel, laser).

Neck Rejuvenation

Traction on the platysma and skin in an oblique, upward, posterior direction will not effectively rejuvenate a neck because it does not restore a defined cervicomandibular angle with proper jawline definition, nor support a ptotic submandibular gland, hence, the often reported need for partial submandibular gland resection. The better solution is to restore youthful anatomy by decreasing the diameter of the cervicomandibular junction with horizontal plication sutures, which also support the submandibular gland as they restore a youthful neck contour (Fig. 14).

Malar Lift

Many authors [12,13] advocate a temporal lift in combination with a malar lift. In our opinion, a lateral malar lift is effected through the placement of suspension sutures fixed in the temporal region. Furthermore, the medial malar region is enhanced by structural fat grafting.

In tying the suspension sutures, it is imperative to overcorrect the pull to compensate for predictable slackening that occurs in the early postoperative period. The amount of overcorrection is a variable

that presents a certain imprecision to the suspension because we cannot predict the precise time when slackening will abate and scar adhesion will be sufficient to maintain our correction. However, direct fixation, as used in the concentric malar lift, can avoid the need for such overcorrection. The vectors of suspension at the orbital rim hollow must be perpendicular to the curved rim and thus converge toward the pupil. In conventional surgery, the vector of suspension typically extends from the lateral malar to the temple. However, this direction transposes malar volume vertically and laterally and may lead to an unnatural appearance [14].

Another surgical alternative to concentric malar lift is fat extrusion and septal reset [15]. But with this technique, to decrease the risk of secondary eyelid malposition, it is mandatory to perform a canthopexy and, frequently, an injection of triamcinolone. The risk of secondary eyelid malposition is the consequence of a large dissection in a very mobile area. Moreover, septal reset does not restore the structure to a youthful position. This technique may further accentuate the fatty ptosis and perhaps worsen the enophthalmos, whereas, as argued by Mendelson [14], “in aesthetic facial surgery, the objective is to restore the youthful position.” Barbed sutures have yet to prove their effectiveness in facial rejuvenation. In fact, these sutures pull the tissues upward and outward for



Fig. 17. (A,B,C) A 60-year-old woman who underwent a four-lid blepharoplasty 5 years previously with septal orbicularis oculi fixation to the lateral canthal periosteum. She has a high resting tone of her corrugator, procerus, depressor supercilii, orbicularis oculi superior malar part, levator labii superioris, depressor anguli oris, and platysma anterior and lateral segments. There is excessive skin around the facial oval and in the neck. (D,E,F) View 5 months after a cervico facial lift, four-lid blepharoplasty (including a concentric malar lift), and section of all the mimetic muscles described previously to reduce resting tone. The patient did not receive any injection (filler or botulinum toxin) or skin resurfacing treatment. The rejuvenation effect, while significant, remains natural.

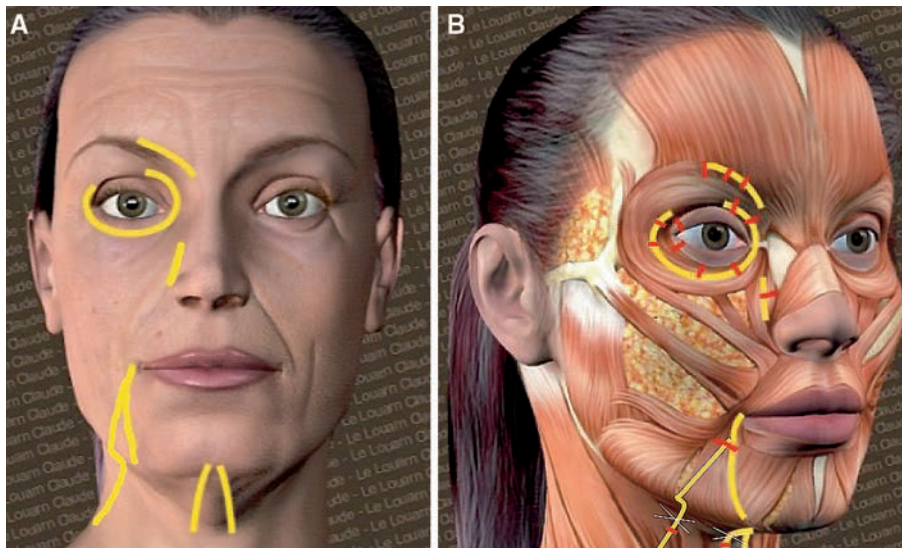


Fig. 18. (A) Paramedian folds and age marker fascicles. (B) Different areas of section (red) and platysma plications (white).

an antigavity effect. However, our concept proposes that gravity plays little or no role in early aging. Consequently, in our opinion, barbed sutures are ineffective on their own and, worse still, create the type of malar elevation that will, in fact, accentuate the inferior hollow orbital. Also, barbed sutures decrease the mobility of the surgically managed area.

Rigidity, it must be remembered, is a sign of age, mobility a sign of youth.

The Concentric Malar Lift

The first suspension suture (Fig. 6A, point 1 for malar fat pad elevation) could compress a part of the

zygomatic or buccal branch of the facial nerve, for example, that supplies the levator labii superioris. The risk of such damage is minimized by elevation of the malar fat pad and the deep fat pad with the finger such that the straight needle passes through the tissues well above the zygomatic bone. In this location, the risk of facial nerve damage is minimal (we have had no facial nerve damage in our series). Using this procedure, the arcus marginalis [14,15] is not sectioned, thus avoiding interruption of the lower lid lymphatics [13], prolonged extension of the lid scar inferiorly (in which scar formation can be unpredictable), and persistent lower lid malposition [16].

Conclusion

We describe a new concept in facial rejuvenation, which we call Face Recurve. This approach brings specific interventions to the age marker fascicles responsible for most of the aging paramedian folds (Fig. 18). In a patient with early aging, for example, the tear trough depression might be filled with hyaluronic acid, while Vistabel injections are placed in the superior malar part of the orbicularis oculi to reduce its resting muscle tone. Sectioning of the depressor anguli oris under local anesthesia can be added, along with structural fat grafting to areas of loss, thus softening the facial oval. Light skin resurfacing treatments could bring improved skin texture. The curves and dynamic functions of a younger face may then be recovered.

The solution for a patient with more advanced aging would involve more surgery. The periorbital region would be improved by a concentric malar lift, whereas the jugal skin excess could be removed using a classical periauricular face-lift incision, but with limited subcutaneous dissection made possible by platysma plication with sectioning of that muscle, together with the depressor anguli oris. Muscle weakening is stabilized with Vistabel injection. The aim is always to reestablish the original anatomy of youth including curved muscle, weak resting muscle tone, sufficient underlying fat, and good skin tone. We can thus plan the best strategy and predict the likely improvement for each patient, and for each facial region of that patient. By integrating the Face Recurve concept into our practice, we can recapture the natural facial curves that define a youthful appearance.

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References

1. Le Louarn C: Nonsurgical facial rejuvenation (Perlane, botulinum toxin). Presented at the I.P.R.A.S. Sydney, August 10 and 15, 2003
2. Le Louarn C: Chirurgie esthétique faciale par la voie d'abord palpébrale supérieure. *J Fran ORL* **45.4**:297–307, 1996
3. Tessier P: Lifting facial sous périoste. *Ann Chir Plast* **34**:193–197, 1989
4. Le Louarn C: Le lambeau musculo-graisseux malaire. *Ann Chir Plast Esthét* **34**:510–513, 1989
5. Le Louarn C: The malar SMAS flap. *Plast Surg* **2**:517–518, 1992
6. Le Louarn C: Le lifting malaire concentrique. 11ème Congrès national de la S.O.F.C.E.P, Strasbourg, France, September 1998
7. Le Louarn C: The concentric malar lift: Malar and lower eyelid rejuvenation. *Aesth Plast Surg* **28**:359, 372, 2004
8. Le Louarn C: Fonctionnal analysis after botulinum toxin injection (in French). *Ann Chir Plast Esthét* **49**:527–536, 2004
9. Negishi S, Li Y, Usas A, Fu FH, Huard J: The effect of relaxin on skeletal muscle injuries. *Am J Sports Med* **33**:1816–1824, 2005
10. Hwang JH, Ra YJ, Lee KM, Lee JY, Ghil SH: Therapeutic effect of passive mobilization exercise on improvement of muscle regeneration and prevention of fibrosis after laceration injury of rat. *Arch Phys Med Rehabil* **87**:20–26, 2006
11. Jarvinen TA, Jarvinen TL, Kaariainen M, Kalimo H, Jarvinen M: Muscles injuries: Biology and treatment. *Am J Sports Med* **33**:745–764, 2005
12. Besins T: The RARE technique. *Aesth Plast Surg* **28**:127–142, 2004
13. Ramirez OM: Full face rejuvenation in three dimensions. A "face-lifting" for the new millennium: Subperiosteal endoscopic technique in secondary rhytidectomy. *Aesth Plast Surg* **25**:152–164, 2001
14. Mendelson BC. Discussion of paper by Barton FE, Ha R, Awada M. Fat extrusion and septal reset in patients with a tear trough triad: A critical appraisal. *Plast Reconstr Surg* **113**(7):2122–2123, 2004
15. Hamra ST: Arcus marginalis release and orbital fat preservation in midface rejuvenation. *Plast Reconstr Surg* **96**:354–362, 1995
16. Hester TR, Codner MA, Mc Cord CD: The centrofacial approach for correction of facial ageing using the transblepharoplasty subperiosteal cheek lift. *Aesth Surg J* **16**:51–58, 1996